Osteomyelitis of Multiple Lumbar Vertebrae Associated with Infected Aortic Aneurysm: A Case Report

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A 73-year-old male patient presented with a pulsating abdominal mass and intractable low back pain for several days. Magnetic resonance imaging revealed an infected abdominal aortic aneurysm invading the second, third, and fourth lumbar vertebrae. He underwent radical debridement of the infected aneurysm with reconstruction using vascular bypass, partial corpectomy of the L2 to L4 vertebrae, anterior reconstruction with autogenous fibular shaft, and posterior instrumentation with posterolateral fusion. Culture of the necrotic tissues grew oxacillin-resistant *Staphylococcus aureus*. He received intravenous vancomycin infusion for 4 weeks and oral ciprofloxacin for 6 months postoperatively. After a 15-month follow-up, no apparent signs of further infection were noted. C-reactive protein and erythrocyte sedimentation rate returned to normal during follow-up. No neurologic symptoms other than mild low back soreness were noted. The stability of the lumbar spine was maintained using long segment reconstruction with autogenous fibula shaft and posterior instrumentation along with posterolateral fusion. Infected aortic aneurysm with vertebral osteomyelitis is a rare clinical entity. Prompt diagnosis and adequate treatment are essential.

Key Words: osteomyelitis, vertebrae, aortic aneurysm
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The coexistence of an infected aortic aneurysm and vertebral osteomyelitis is uncommon. Only scattered cases have been reported [1–3]. Pathogens involved included salmonella, Gram-negative bacilli, Gram-positive cocci, mycobacteria, and fungi [1]. Despite well-documented treatment options, accurate diagnoses are usually delayed due to innocuous symptoms in the disease's initial clinical stages. As a result, there is a high mortality rate due to delayed or inadequate treatment. The extension of the infection may originate from either the infected aortic aneurysm or the vertebral osteomyelitis, destroying and invading neighboring tissues. The principles of treatment are the same irrespective of the sequence of the infectious process. Infection must be eradicated thoroughly at both sites. Meanwhile, adequate medical treatment with relevant antibiotics is necessary to give a lasting successful result. If the infection cannot be well controlled, either aneurysm rupture or persistent sepsis could be fatal. We report a patient with concomitant infected aneurysm of the abdominal aorta and vertebral osteomyelitis of L2 to L4 who was treated successfully.

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Case Presentation

A 73-year-old male was admitted to our institution due to a pulsating mass over the left lower quadrant of the abdomen.

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He found the pulsating mass accidentally about 1 month prior to admission. He did not present at that time because he was not in any pain from the mass. However, he experienced progressive lower back pain since discovering the mass. Poor appetite and mild fever developed gradually 1 week before hospitalization. A visible pulsating mass about 6 cm in diameter over the left lower quadrant of the abdomen was found on physical examination. Plain roentgenograms of the lumbar spine showed destroyed anterior cortices of the second, third, and fourth lumbar vertebrae. Magnetic resonance imaging (MRI) revealed an abnormally dilated abdominal aorta, beginning from below the left renal artery (Figure 1). The enlarged mass tapered in diameter just before dividing into the common iliac arteries. The anterior third of the L2 to L4 vertebral bodies was replaced by necrotic tissue.

The patient was admitted for a suspected infected aortic aneurysm. We were asked by the cardiovascular surgeon to help treat the destructive lumbar vertebral lesions. A two-staged operation was performed: initial posterior transpedicular fixation from T12 and L1 proximally to L5 and S1 distally using the TSRH pedicle screw (Medtronic Sofamor Danek, Memphis, TN, USA), followed by posterolateral fusion with autogenous iliac cancellous bone. An exploratory laparotomy was performed 1 week later, when an extra-anatomic bypass using an artificial vessel graft was routed from the right axillary artery to the femoral artery combining crossing femoral-to-femoral anastomosis. The infected aortic aneurysm and the surrounding necrotic tissue were removed and radically debrided. The abscess around the infected vertebrae was evacuated. Partial corpectomy of the L2 to L4 vertebrae was carried out to remove the necrotic tissues. A 14 cm fibula shaft was harvested from the left leg and impacted into the defect to support the anterior vertebral column (Figure 2). The wound was then closed layer by layer after placement of drainage tubes.

Figure 1. *Dilated aortic aneurysm (arrows) anterior to the L2 to L4 vertebrae with abscess formation.*

Figure 2. *Fibula shaft inserted to support the anterior column.*

Culture of the necrotic tissues revealed oxacillin-resistant *Staphylococcus aureus*. Hence, intravenous vancomycin 500 mg every 8 hours was administered for 4 weeks. Thereafter, oral ciprofloxacin 500 mg bid was prescribed for 6 months. He wore a Boston brace for 4 months and was advised to come for follow up at our outpatient clinic every 6 weeks for at least 6 months. Except for mild lower back soreness, the patient did not suffer from abdominal symptoms or back pain from 6 months after the operations. C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) returned to within normal ranges in the fourth postoperative month. Plain roentgenograms of the lumbar spine showed no migration or resorption of the fibula graft (Figure 3), even without definite evidence of its fusion to the neighboring vertebral bodies. No major complications were noted except for localized stitch abscesses over the harvesting site of the fibula graft, which healed after adequate wound care. There was no evidence of recurrence after 2 years.

Figure 3. *No dislodgement or resorption of the fibula graft about 15 months postoperatively.*

Discussion

Delayed diagnosis with resulting inadequate treatment is the major cause of the high mortality in patients with concomitant infected aortic aneurysm and vertebral osteomyelitis [1,4]. Early signs and symptoms, such as back pain, fever and abdominal discomfort, are non-specific; misdiagnosis and delayed diagnosis often lead to fatal consequences. Obvious signs and symptoms are often only noted late in the progression of the disease. Therefore, a high index of clinical alertness and suspicion is necessary. For example, if a patient suffers from fever of unknown origin, a pulsatile abdominal mass implies the possibility of an infected aortic aneurysm. Sudden onset of severe back pain accompanied by fever should also arouse suspicion of vertebral osteomyelitis. In order to make a timely correct diagnosis, it is necessary to perform blood culture and abscess culture to identify the pathogen, although the positive growth rate is only about 70% [4–6].

According to the 70 cases reported in the past 30 years [1, 2], the most common causative pathogen is *Salmonella* sp. Gram-negative bacilli, mycobacteria, Gram-positive cocci, and fungi were also included in the wide variety of pathogens. Gram-negative bacilli carry the highest risk of aneurysm rupture, while Gram-positive cocci carry the least risk. In this case, cultures from the abscess and aneurysm wall grew *S. aureus*, which may have been the reason that the patient could be treated successfully before fatal rupture of the aneurysm.

Treatment of combined infected aortic aneurysm and lumbar vertebral osteomyelitis requires a well-planned surgical and medical approach. Preoperatively, aortography can be used to define the extent of the aneurysm. However, MRI is a better modality to identify vertebral osteomyelitis and abscess formation. Radical debridement to eradicate the infectious sources, including the infected aortic aneurysm and vertebral osteomyelitis, is the only option to ensure effective postoperative treatment using appropriate antibiotics. Due to the possibility of the development of further infection on the implanted vessel graft in situ, an extra-anatomic bypass graft is preferred [7,8]. For this patient, posterior fixation with instrumentation was performed initially to secure the stability of the lumbar spine. One week later, radical resection of the infected aneurysm was followed by right axillofemoral bypass graft with femoral-to-femoral anastomosis. After the vascular procedure, partial debridement was carried out using partial corpectomy from L2 to L4. A 14 cm autogenous fibula bone graft was then harvested for anterior reconstruction to maintain the stability of the anterior column. Tricortical iliac bone is the most common source of bone graft for anterior reconstruction of the lumbar spine. However, it is limited by the size and length of the harvested iliac bone. Hence, the fibula shaft was used for the bone graft in this case.

In addition to surgical intervention, adequate and appropriate antibiotics are necessary to guarantee successful treatment. Intravenous antibiotics should be started 1 to 4 days before surgery and continued for at least 4 to 6 weeks. Thereafter, oral antibiotics for 6 months are commonly recommended [1,4]. Even lifelong antibiotic treatment has been proposed [9]. Our patient received oral antibiotic for 6 months despite normal ESR and CRP from the fourth month postoperatively. At the last follow-up about 2 years after surgery, the patient was well except for mild lower back soreness.

Eradication of the infectious sources is the only way to successfully treat patients with concomitant infected aortic aneurysm and vertebral osteomyelitis. To achieve a favorable result, resection of the infected aneurysm, extra-anatomic bypass graft, debridement of vertebral osteomyelitis, reconstruction for spinal stability, and adequate and appropriate antibiotics are necessary.

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